

## **REMARKS**

This is a full and timely response to the outstanding non-final Office Action mailed November 18, 2004. Through this response, claims 1 and 6 have been amended to correct for typographical errors and provide further clarity, claim 36 has been added, and claims 10-17 and 29-35 have been canceled without prejudice, waiver, or disclaimer. Reconsideration and allowance of the application and pending claims 1-9, 18-28, and 36 are respectfully requested.

### **I. Amendments to the Specification**

Various amendments have been made to the specification through this response to correct typographical and grammatical errors and to provide a correct and accurate description of Applicants' invention as originally disclosed. Although these amendments effect several changes to the specification, it is respectfully asserted that no new matter has been added.

### **II. Restriction**

Applicants acknowledge the Examiner's withdrawal from consideration claims 10-17 and 29-35, and thus in the interest of expediting issuance of claims, have canceled claims 10-17 and 29-35 without prejudice, waiver, or disclaimer.

### **III. Claim Rejections - 35 U.S.C. § 102(b)**

#### **A. Statement of the Rejection**

Claims 1-9 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by *Ayazi et al.* ("Ayazi," High Aspect-Ratio Combined Poly and single-crystal Silicon (HARPSS) MEMS Technology, J. of Micro. Sys., Vol. 9, No. 3, September 2000). Applicants respectfully traverse this rejection.

## B. Discussion of the Rejection

It is axiomatic that “[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration.” *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983). Therefore, every claimed feature of the claimed invention must be represented in the applied reference to constitute a proper rejection under 35 U.S.C. § 102(b).

### Independent Claim 1

As recited in independent claim 1, Applicants claim (with emphasis added):

1. A method for fabricating micro-electro-mechanical system (MEMS) capacitive resonators, the method comprising:  
forming trenches in a substrate;  
conformally coating the substrate with an oxide;  
filling the coated trenches with polysilicon;  
patterning the polysilicon;  
***releasing a resonating structure derived from the substrate***; and  
removing the conformally coated oxide.

Applicants respectfully submit that *Ayazi* does not disclose the emphasized claim features. Applicants have amended the claim language to correct the typographical error of “resonator structure” by replacing the same with “resonating structure.” This should clarify that the ***resonating structure is derived from the substrate***, unlike *Ayazi*, which discloses that a resonating structure is derived from the polysilicon deposited in the trenches. Thus, Applicants respectfully submit that independent claim 1 is allowable over *Ayazi* and that the rejection to claim 1 be withdrawn.

Because independent claim 1 is allowable over *Ayazi*, corresponding dependent claims 2-9 are allowable as a matter of law for at least the reason that dependent claims 2-9 contain all elements of their respective base claim. See, e.g., *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988).

Additionally, dependent claims are allowable on independent grounds. For example, with regard to dependent claim 3, Applicants respectfully submit that *Ayazi* does not disclose

***“wherein the releasing comprises separating the resonating structure from the polysilicon,”***  
as recited in dependent claim 3. In *Ayazi*, the resonating structure is the polysilicon, so the resonating structure in *Ayazi* clearly cannot be separated from itself. Thus, claim 3 is allowable over *Ayazi* on separate grounds.

Due to the shortcomings of the *Ayazii* reference described in the foregoing, Applicants respectfully assert that *Ayazii* does not anticipate Applicants’ claims. Therefore, Applicants respectfully request that the rejection of these claims be withdrawn.

#### **IV. Claim Rejections - 35 U.S.C. § 103(a)**

Claims 18-28 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Ayazi* in view of *Lin et al.* (“*Lin*,” U.S. Pat. No. 6,413,793). Applicants respectfully traverse this rejection.

As has been acknowledged by the Court of Appeals for the Federal Circuit, the U.S. Patent and Trademark Office (“USPTO”) has the burden under section 103 to establish a proper case of obviousness by showing some objective teaching in the prior art or generally available knowledge of one of ordinary skill in the art that would lead that individual to the claimed invention. See *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Accordingly, to make a proper case for obviousness, there must be a prior art teaching or established knowledge that would suggest to a person having ordinary skill in the pertinent art to fill the voids apparent in the applied reference. It is respectfully asserted that no such case has been made in the outstanding Office Action.

In addition to the above described defects of the rejection, Applicants respectfully assert that the proposed combination is improper. It has been well established that teachings of references can be combined only if there is some suggestion or incentive to do so. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933

(Fed. Cir. 1984). Accordingly, there must be a teaching in the relevant art which would suggest to a person having ordinary skill in that art the desirability of implementing the claimed method using an semiconductor-on-insulator (SOI) substrate.

The mere fact that a reference teaches away from the combination with another reference is sufficient to defeat an obviousness claim. See *Gambro Lundia AB*, 110 F.3d at 1579, 42 USPQ2d at 1383. A “reference will teach away if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.” *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). Applicants respectfully submit that the proposed combination is unlikely to be productive.

#### **Independent Claim 18**

As recited in independent claim 18, Applicants claim (with emphasis added):

18. A method for fabricating micro-electro-mechanical system (MEMS) capacitive resonators, the method comprising:  
forming trenches in a ***semiconductor-on-insulator substrate***;  
conformally coating the ***semiconductor-on-insulator substrate*** with an oxide;  
filling the coated trenches with polysilicon, wherein electrodes are derived from the polysilicon;  
forming release openings; and  
removing the conformally coated oxide and an oxide of the ***semiconductor-on-insulator substrate***, wherein a capacitive gap is formed, wherein a resonating element of the capacitive resonator is released.

As acknowledged by the Office Action, *Ayazi* does not explicitly teach the semiconductor-on-insulator (SOI) substrate. Applicants concur. However, Applicants respectfully disagree with the statement made on page 6 of the Office Action, reproduced below:

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form MEMS resonator of *Ayazi* on SOI structure as taught by *Lin* since SOI provides significant advantages, such as superior electrical isolation between adjacent components, reducing of integrated circuit capacitance, and lower operating voltages.

As an initial matter, there is no suggestion in *Ayazi* of using an SOI substrate in the fabrication method. At least for that reason, Applicants respectfully submit that the proposed combination is improper.

Additionally, the proposed combination is improper because the method disclosed in *Ayazi* would likely lead to unproductive results when using an SOI substrate. For example, in the section of *Ayazi* cited by the Office Action, *Ayazi* discloses that a sacrificial oxide layer is used to protect the structures during the isotropic silicon etching step, which, unlike the method claimed by Applicants, imposes a limit on the minimum tolerable sacrificial oxide thickness.

Further, since the method disclosed in *Ayazi* uses isotropic silicon etching to undercut the structures, this may lead to uncertainty in defining the bottom side of the structures. For block and disk resonators with large width to height ratios, this could lead to unproductive yields in fabrication. It is noted that the SOI substrate enables the formation of silicon resonating structures. For example, Applicants are unaware of any evidence of the formation of perfect block or disk structures with flat, micro-finished bottom surfaces on regular silicon substrate through the teachings in *Ayazi*.

Also, the use of SOI enables the formation of multiple, electrically-isolated resonators (e.g., claim 36), which in turn enables independent tuning and operation of the resonators. That is, the body of the resonating structures in SOI-based embodiments are not connected to each other through a common substrate. Applicants are unaware of any evidence of structures or methods using the teachings of *Ayazi* to achieve this electrical isolation between the body of individual silicon resonators on a regular silicon substrate.

In summary, it is Applicants' position that a proper case for obviousness has not been made against Applicants' independent claim 18, or claims 19-28 and 36 which depend therefrom. Therefore, it is respectfully submitted that each of these claims is patentable over the

proposed combination of *Ayazi* and *Lin* and that the rejection of these claims should be withdrawn.

**V. Canceled Claims**

As identified above, claims 10-17 and 29-35 have been canceled from the application through this Response without prejudice, waiver, or disclaimer. Applicants reserve the right to present these canceled claims, or variants thereof, in continuing applications to be filed subsequently.

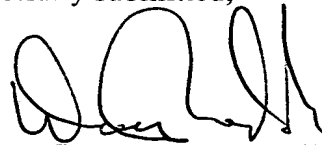
**VI. Newly Added Claims**

As identified above, claim 36 has been added into the application through this response. Applicants respectfully submit that this new claim describes an invention novel and unobvious in view of the prior art of record and, therefore, respectfully request that this new claim be held allowable. Further, it is respectfully asserted that no new matter has been added.

**CONCLUSION**

Applicants respectfully submit that Applicants' pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,



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